

Project Title:

Coordinated Regional Natural Resource Monitoring and Training Program for Tribal and Private Landowners with Land Parcels in Areas of Coal Bed Methane Development

Sponsoring Organization:

Montana State University

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Review Team Proposal Checklist

EXECUTIVE SUMMARY

We request funding for both a Regional Geographic Initiative and Water Quality Projects.

Title: Coordinated Regional Natural Resource Monitoring and Training Program for Tribal and Private Landowners with Land Parcels in Areas of Coal Bed Methane Development

Hydrological Unit Code(s), Latitude and Longitude of Project Site(s), Name of Watershed

This is a regional project in areas of existing and potential coal bed methane (CBM) development in Montana, Wyoming, Colorado, Utah, and the Northern Cheyenne and Crow Tribal lands.

Environmental Setting/problem

Coal bed methane (CBM) development has the potential to have widespread impact on the natural resources in many states in EPA region 8. Both untapped and currently exploited resources of CBM exist in Wyoming, Montana, Colorado, and Utah. The extraction of CBM involves pumping large volumes of water from the ground in order to release the water pressure that is trapping the gas in the coal seam. What to do with this large volume of poor-quality CBM wastewater is a source of much debate. Each well is expected to produce approximately 5 to 20 gallons of water per minute. If a well produced 12 gallons per minute, that would total 17,280 gallons of water per day for one well. The wastewater, although acceptable to drink or water livestock with, has a modestly high salinity hazard and often a very high sodium hazard based on standards used for irrigation suitability. Irrigation with water of CBM quality could permanently degrade soil physical and chemical properties, making it unsuitable for crop production; it could also limit the sustainability of rangeland and riparian species. The potential impact of CBM discharges and impoundments on ground water and ephemeral and perennial streams, native and culturally significant plant species is unknown.

Major Goals

To empower landowners/Tribal members within the CBM affected states to initiate monitoring of soil, water, wetland and riparian resources to: a) understand baseline quality and condition of resources b) understand the potential impact of CBM development prior to contracting with a CBM developer; c) monitor resource changes as a result of CBM development c) appreciate appropriate steps to mitigate, restore and prevent irreversible natural resource degradation.

Project Summary

We have recognized the need for a simple inventory and monitoring protocol for land owner, managers, and Tribal members to voluntarily collect and record annual data of key indicators of soil, water, and plant community types. We will create a monitoring handbook, record sheets, and associated support documents to assist landowners in a simple protocol in how to plan and efficient, meaningful monitoring program with guidelines on site selection, monitoring instructions and data interpretation. After regional pilot testing and landowner feedback of the manual and support tools, we will have a user-friendly, concise on-line handbook. Although environmental benefits may not be immediately recognizable in terms of monitoring data and management changes, we will document voluntary adoption of a protocol which is not currently done prior-to landowner/CBM developer contracts and we will identify

significant trends in resource conditions identified by individuals assessing the monitoring tools.

GRANT PROPOSAL

T = Component on RFP checklist or suggestions for strengthening proposals

ENVIRONMENTAL PROBLEM INTRODUCTION

With the increasing demand of power/energy resources, coal bed methane (CBM) development has the potential to have widespread impact on the surface water, ground water and wetland/riparian resources in many states in EPA region 8. According to the United States Geological Survey, the Rocky Mountain Region has extensive coal deposits with significant storage of coal-bed methane gas. Untapped resources of coal bed methane exist in the Powder River Basin of Wyoming and Montana, the Greater Green River Basin of Wyoming, Colorado, and Utah, the Uinta-Piceance Basin of Colorado and Utah, and the Raton and San Juan Basins of Colorado and New Mexico (USGS Fact Sheet FS-110-01, Nov 2001).

The extraction of CBM involves pumping tremendous volumes of water from the saturated coal seam in order to release the water pressure trapping the gas in the coal seam. *T* *What to do with this huge volume of often poor-quality CBM wastewater is a source of much debate.* Each well is expected to produce 5 to 20 gallons of water per minute. At 12 gallons per minute, a total of 17,280 gallons of water per day coming from one well. For example, in the Powder River Basin of Montana alone, approximately 3,600 square miles of southeastern Montana has coal beds with the methane resource. It is projected that as many as 75,000 wells will be constructed to extract the natural gas. Currently, CBM wastewater is discharged into a stream channel, impounded, or land applied to crop or range land. Although direct stream discharge is no longer permitted on new wells, proposals are being advanced to allow regulated discharges during certain flow conditions. In addition, seepage flow from impoundments is likely to reach some stream channels. This enormous scale of dewatering and translocation of wastewater may have serious impact on soil, surface and ground water quality, on the health and condition of riparian and wetland plant communities, and on downstream land irrigated with water from channels delivering CBM wastewater.

Coal bed methane wastewater has a modestly high salinity hazard and often a very high sodium hazard based on standards used for irrigation suitability. Irrigation with water of CBM wastewater quality on range or crop lands can be very risky. With time, salts from the wastewater will accumulate in the root zone to concentrations which will affect plant growth. Saline conditions stunt plant growth because plants must work harder to extract water from the soil. Current research at Montana State University shows water with sodium levels equal to that in CBM wastewater will permanently degrade the physical and chemical properties of heavier, clay soils, making such soils completely unsuitable for plant growth. Montana State University recommends irrigation with CBM wastewater only on the most coarse soils with very rigorous management. Unfortunately, much of the irrigated lands in the Tongue, Powder River, and lower Yellowstone River valleys of Montana and Wyoming are on clay soils.

Disposal of vast quantities of CBM wastewater into stream channels and on the landscape poses a serious risk to the health and condition of existing riparian and wetland areas. In the Powder River Basin of Wyoming, discharge of the saline/sodic wastewater is converting ephemeral channels to perennial channels. The increase in discharge in the stream channel may expand existing and/or create new riparian and wetland areas. The high salinity and sodium levels in the wastewater may alter riparian and wetland plant communities with

the replacement of salt intolerant species with more salt tolerant species. Once CBM development has ceased, wetland and riparian areas may contract to pre-development states, leaving saline/sodic soils open to encroachment of salt tolerant upland plant or weed species. It is well recognized that encroachment of such noxious species as salt cedar, Russian olive, leafy spurge is enhanced by saline conditions.

GOALS OF THE PROJECT

To empower landowners and Tribal members within the CBM production areas of Montana, Utah, Wyoming, Colorado and the Tribal lands of the Northern Cheyenne and Crow to initiate a watershed approach to monitoring soil, water, wetland and riparian resources to: a) understand baseline quality and condition of soil, water, wetland and riparian resources in the watershed b) understand the potential impact of CBM development prior to contracting with a CBM developer; c) monitor resource changes as a result of CBM development c)

T appreciate appropriate steps to mitigate, and prevent degradation of surface water, ground water, soil, riparian and wetland resources. T T This is a grass-roots strategy/plan addressing the CBM wastewater disposal issue on a landscape scale using a multimedia approach by leveraging and focusing resources and community approaches to mitigating and/or solving the problem of CBM development on the landscape. Early baseline data collection is critical to establishment of more advanced and rigorous water quality monitoring programs.

PROJECT DESCRIPTION

Ecosystem/watershed(s)targeted by project

A regional project targeting EPA region 8 Regional Geographic & Special Emphasis Areas:

T Watersheds affected by CBM development in the states of Montana, Wyoming, Utah, and Colorado The initial focus will be within the Powder River Basin of MT and WY and the Raton Basin of CO.

T High priority watersheds in Northern Cheyenne and Crow Tribal lands affected by CBM development

T Lower Yellowstone River, Montana, below the confluence of the Tongue and Powder Rivers

Location of Project

Land owners, managers and Tribal members' property within the watersheds directly affected by CBM development; and within Buffalo Rapids' 80,000 irrigated acres in the Lower Yellowstone River below the confluence of the Tongue and Powder Rivers, who may be affected by upstream discharges of CBM wastewater into the Powder and Tongue Rivers.

Background Information

T In response to a request by soil and water conservation districts in southeast Montana and individuals of the Crow and Northern Cheyenne Reservations, *we have recognized the need for a simple watershed-scale inventory and monitoring protocol for land owners, managers, and Tribal members to voluntarily collect and record annual data of key indicators of soil, water, and plant community types.* Such a tool will empower land owners, managers, and Tribal members to recognize initial symptoms of impacts of CBM wastewater disposal and CBM development to protect soil, water, and plant resources on the landscape.

We have identified key deficiencies in existing resources which will compromise the landowner/land manager's ability to identify incidences specific to impact from CBM development on their landscape. Existing monitoring guides tend to be lengthy technical handbooks for resource professionals, or they are lengthy manuals for landowners addressing only one of the natural resources. None of the existing guides are specific to dewatering and saline/sodic water quality impacts from CBM development to ephemeral and/or perennial channels or riparian areas.

We have interviewed producers in areas of proposed CBM development, and we have spoken with producers who are already impacted by CBM development on their land. They share the concern of what impact development will have on the land resources and how to quantify those impacts and changes to the land resources. Through our conversations, they now understand the potential impact and know the importance of monitoring the resources to prevent irreparable degradation of the resources. They are willing to monitor if the protocol has been tested by other landowners and has been proved to be feasible.

Work to be completed to achieve the goals listed above

Please see the Milestone table on the next page for staff, and hours necessary to complete the work described below.

1. Create a monitoring handbook and support tools

We will create a monitoring handbook, record sheets, and associated support documents to assist landowners in a simple protocol in how to plan and efficient, meaningful watershed-scale monitoring program with guidelines on site selection, monitoring instructions and data interpretation. These resources will be available both as hard copy and on-line. We will also create a data entry and retrieval system which will interpret landowner monitoring data.

The focus of monitoring will be on detecting changes in the following factors:

- salinity and sodicity of surface and ground water quality
- surface water macroinvertebrate communities
- surface water quantity (flow)
- ground water quantity (well depth, spring flow, appearance/expansion or disappearance/contraction of seep areas, wetlands and riparian areas)
- soil chemical/physical properties in areas intended for land application or irrigation with CBM wastewater and in riparian and wetland areas
- riparian/wetland plant communities with focus on out-competition by salt tolerant plant species and encroachment of upland plant communities.

We will draw on pertinent components of accredited monitoring handbooks to construct the foundation of our monitoring and assessment tools but our goal is to create a concise, user-friendly, on-line accessible and usable handbook. *With input and cooperation from our regional and Tribal partners, the handbook will be transferable to other CBM related regions and to any other development issue with potential impact to soil, water, and plant resources.*

2. Technical Review

To assure the manual is regionally appropriate, we will utilize technical expertise for editorial review from our region 8 partners within the proposed CMB development area (Montana, Colorado, Utah, Wyoming). Each participating state/Tribal member will be

contracted to:

- provide suggestions and input to initial outline
- review initial draft for content
- suggest modifications/inserts to address state or reservation specific issues
- secure and provide updated lab, state regulatory and other contact sheets
- incorporate Montana web-accessible manual, web addresses in state web pages
- identify additional support documents, references, resources, connections
- review revised manual, record sheets, on-line tools
- solicit comments from interested, vested state partners, DEQ, NRCS, and conservation districts

3. Conduct training and pilot testing with the monitoring handbook and support tools

Montana State University, and each of our cooperating state/Tribal members of Colorado, Utah, Wyoming, Northern Cheyenne and Crow Reservations will:

- identify specialist trainers and 10 landowner cooperators teams through conservation districts, county Extension offices or Tribal Departments, to review, work through, and assess the manual, record sheets and support tools
- develop a state-specific training mechanism, and schedule
- complete state-specific training of the specialist/landowner teams
- monitor, encourage, promote the completion by specialist/landowner teams
- solicit and summarize comments, suggestions, concerns of reviewers
- conduct follow-up assessment of implementation
- prepare final report - will include: # copies distributed, name and contact of evaluators, # of training meetings held, summary of training evaluations, summary of reviewer comments, likelihood of landowner adoption, recommendations for revisions and modifications to monitoring tools.

5. Train conservation districts, county Extension faculty, Tribal and other professionals in CBM development areas on the use of the manual and the assessment protocol.

Once the final version of the manual is complete regional training sessions will be conducted for resource professionals who will assist land owners in their resource assessment program.

6. 7 Measurable institutional results within a 2-year time frame

Although environmental benefits may not be immediately recognizable in terms of monitoring data and management changes, through follow-up assessments, we will document voluntary use and adoption of a protocol which is not currently done prior-to and during authoring of landowner/CBM developer contracts. We will attempt to maintain a mailing list of individuals utilizing the resources and will attempt to periodically inventory participants to identify significant trends in resource conditions identified by individuals assessing the monitoring tools.

Outputs and Progress Reports

Deliverables: hard copies of monitoring manual, electronically accessible monitoring manual with supporting links, data interpretation page(s), training package.

Reports: reports will be submitted on a quarterly basis to EPA Region 8. Included in the report will be progress toward milestones, reasons for slippage, and adjustments toward completion

dates. We will also provide a one-page public information and education fact sheet on the status and progress of the project with each quarterly report.

Milestones

Start Date	Completion Date	Task	Who	Approx Hours
month 1	month 6	develop draft of manual and record sheets	Kristin Keith, Jim Bauder, Clayton Marlow MSU	350
month 6	month 7	review/suggestions to draft manual and record sheets identify/create additional support documents, references, resources	State/Tribe partner subcontract	120 x 5
month 8	month 8	revise draft manual and record sheets based on comments/suggestions	Kristin Keith, Jim Bauder, Clayton Marlow MSU	120
month 9	month 9	review and suggestions to revised manual, record sheets, support tools	State/Tribe partner subcontract	40 x 5
month 9	month 11	create on-line manual with supporting weblinks and create training protocol	MSU production team members	160
month 10	month 11	complete pilot test version of the manual, record sheets, support tools	MSU production team members	60
month 12	month 16	Train specialists in state and tribes Specialists work with identified landowners	MSU production team members State/Tribe partner subcontract	320 x 6
month 17	month 17	Solicit and summarize comments, suggestions, concerns of reviewers	MSU production team members State/Tribe partner subcontract	80 x 6
month 17	month 18	incorporate landowner suggestions into manual & tools	MSU production team members	40
month 19	month 20	Train resource professionals	MSU, State/Tribe partner	24 x 6
month 16	month 23	conduct follow-up assessment of implementation	MSU, State/Tribe partner	160 x 6

BUDGET

Total requested funding: \$130,000. This proposal and funding request reflects a combined funding request of \$100, 000 from Water Quality Program Grants and \$30,000 from Regional Geographic Initiatives programs.

Matching contribution: \$7,500

Project total: \$137,000

Collaborating state partner subcontract budget and project coordination team budget (MSU)

Collaborating team members (WY, CO, UT, Little Big Horn, Chief Dull Knife)

1 month project assistance	3,000	15,000
1 month benefits	1,200	6,000
communications (phone, mail, etc)	600	3,000
travel	2,000	10,000
reviewer assistance/costs - stipends	2,000	10,000
report/data summaries	<u>1,200</u>	<u>6,000</u>
Subtotal	10,000 x 5 = \$50,000	

Coordination and production team member (MSU)

1/2 FTE (oversight, coordination, assemblage)	16,000
benefits	6,400
communications	1,200
copies/reproduction/distribution	3,000
travel	5,000
web production	16,400
stipends	<u>2,000</u>
Subtotal	50,000

Subtotal Direct Costs	\$100,000
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Indirect charges - educational institutional rate (29.5%)	\$29,500
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Total	\$129,500
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Note: no funding requested for equipment, sampling and analysis. Indirect costs charged at established educational/institutional rate of 29.5% of all direct charges.

Budget Line Item Narrative Explanation

Budget Page Line Item Explanation-

Salaries:

Participating partner project subcontract completion: Collaborating team members (WY, CO, UT, Little Big Horn, Chief Dull Knife). 1 month project assistance per participating partner @ \$3000 per partner = \$15,000. Project coordinator/MT data collection, assembly, monitoring tool development - 6 man-months @ \$2,667 per month = \$16,000. Project total salaries - \$31,000.

Benefits:

Benefits for all salaries charged at rate of 40% of salaries. $0.40 \times \$31,000 = \$12,400$.

Communications:

Phone, fax, mail/postage: Distribution of draft documents to team partners, distribution of draft monitoring tools to contracted reviewers, distribution of supporting materials. \$600 per participating team partner + \$1,200 project team leader/coordinator. Project total communications - \$4,200.

Travel:

Travel consists of partner team member travel associated with training of reviewers, coordination meeting between participating state team members, prototype data collection, field trials. \$2,000 per team partner x 5 team partners = \$10,000. \$5,000 travel for MT contingent, field trials, coordination between partner states. Project total travel - \$15,000.

Copies/reproduction/distribution:

Initial draft monitoring tool, supporting materials, resource documentation provided by partner teams, revised monitoring manual and web support materials. Project total copies/reproduction/distribution - \$3,000.

Reviewer assistance/costs - stipends:

10 landowner reviewers per participating partner @ \$200 stipend per reviewer x 6 participating team members. Project total reviewer assistance stipends - \$12,000.

Reporting/data summaries, data assembly:

\$1,200 per participating team member. Project total data summaries - \$6,000

Web production:

This task will be managed and completed by project team leader. 7 man-months @ \$2,400 per month, contracted services. Project total web production - \$16,400.

Matching contribution:

Prairie County Conservation District has secured funding through MT Legislature HB 223, Sustainable Resources, for cost associated with additional components including landowner legal rights, mineral and surface rights information. Matching contribution: \$7,500.

Coordinated Regional Natural Resource Monitoring and Training Program for Tribal and Private Landowners with Land Parcels in Areas of Coal Bed Methane Development

Proposal for Funding
Environmental Protection Agency
Consolidated Funding Proposal

Water Quality & Regional Geographic Initiative

Dr. James W. Bauder
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Montana State University